

INTRODUCTION

The ISIS manual can be downloaded from the IDOT web site www.dot.state.il.us under the "Doing Business" selection. The manual is also available as an IDOT electronic pdf document found within the Inside IDOT Intranet.

A. PURPOSE

The purpose of this manual is to provide an instrument that will enable designated offices within the Illinois Department of Transportation and local highway agencies to monitor and manage the vast amount of structure data contained in the information systems. The manual will allow interpretation of various reports and formatted data generated by the systems for users of such data in addition to interpretation of specific up-to-date items by viewing computer inquiry screens. A third group to whom the manual or parts of it could serve to be beneficial would be that group not familiar with the systems that use such data, such as the media. For them, an understanding of the depth and completeness, in addition to explanation of specific data, would be enhanced.

B. BACKGROUND

Highway inventory operations began during the winter of 1935-1936 with the inventory of rural roads in a federally sponsored Highway Planning Survey. State and county municipal sections were added shortly thereafter. A re-inventory program of selected counties was started in 1940 and resumed in the late 1940's after having been curtailed during the World War II years. This planning function continued relatively unchanged until the early 1970's. The State District Highway offices had full field inventory responsibility for both state and local highways. Local agencies participated only to the extent of making construction plan data, etc., available.

Included in the highway inventory process was an effort that inventoried and evaluated structures having a greater than 20 foot opening, face to face of abutments. For each structure, a Highway Structure Sheet was kept and updated during the re-inventory cycle or as certain revisions became known. Recorded on the structure sheet, in addition to inventory items, were a description of the bridge type, span lengths, width, clearances, material, load limits, and a cursory "good, fair or poor" condition evaluation for superstructure, substructure, surface, arches and culvert elements. The evaluations were often made by persons in the field, having limited or no structural background, during the inventory of the roadway. However, the structure sheet provided a fairly good record for each major structure serving public highways, roads and streets in the state and provided a base from which statistical data were prepared to satisfy federal requirements.

Today's structures reflect the technical advances in design, construction, and safety features that have evolved over the years. However, many structures serving today's highways and roads were built before or soon after the turn of the century. Because of the advancing age (in excess of 50 years) of these and many other structures, and in spite of the technological advances made over the years, the adequacy of the structure system as it relates to the overall highway network demands close scrutiny and continual attention.

Tragic occurrences of bridge failures raise public concern and cause public agencies and persons in the industry to consider the entire nationwide situation.

The collapse of the Silver Bridge at Point Pleasant, West Virginia in 1967 aroused public interest in the inspection and maintenance of bridges. The United States Congress added a section to the Federal Aid Highway Act of 1968 that required the Secretary of the U.S. Department of Transportation to establish national bridge inspection standards. As a result, the Federal Highway Administration (FHWA) developed requirements for a program of inventory and appraisal of the nation's bridges. This has become known as the National Bridge Inspection Program (NBIP).

The original Act pertained to only those structures on the Federal-Aid system, but on November 6, 1978, the President signed into law the Surface Transportation Assistance Act of 1978. The Highway Bridge Replacement and Rehabilitation portion of the law provides that by December 31, 1980, all public bridges not on the Federal-Aid system should also be inspected and inventoried in accordance with the National Bridge Inspection Standards (NBIS).

The NBIP in Illinois was developed as a cooperative effort. Several bureaus within the Illinois Department of Transportation (IDOT) worked together to establish inspection and reporting procedures. Realizing that bridges under the jurisdiction of IDOT constitute only part of the total number of bridges used by the public, local agency participation was solicited by the Bureau of Local Roads and Streets through the Association of County Highway Superintendents and the Municipal League. Recognizing the importance of the NBIP for public safety, the organizations urged their membership to voluntarily participate in the program. Thus, in 1971, the IDOT Bureaus of Design, Maintenance, Traffic, Construction, Local Roads and Streets, and Planning, and the County Highway Superintendents and City Engineers officially launched the NBIP in Illinois.

Realizing that much of the information required for the NBIP would be of value to many agencies in Illinois (including some not directly involved in the program), a centralized information repository was established. This was made an integral part of the computerized Highway Record Data Bank (HRDB) maintained by the IDOT Office of Planning and Programming, Planning Services Section. Integrating

NBIP data with the HRDB enabled a structure to be examined not only as a separate entity, but also as a vital part of an existing road network. This duality of function was equally important in terms of developing short-term projects and long-range plans. At the same time, the impetus provided by the NBIP served to elevate the status of the structure. It was no longer just part of a road, but a unit in itself that could be improved without reference to the roadway. This facilitated improvements to unsafe structures.

The National Bridge Inspection Program consists of two inseparable parts: (a) inventory; and (b) inspection and appraisal. The inventory is an accounting of what is there, where it is, and to whom it belongs. The inspection and appraisal measures how safe and useful it is. The two portions together provide an indicator of how well the structure is functioning to serve the public. The extensive data base provides a useful tool to identify problem areas and to quantify the degree of the problem. Measures can then be developed to rectify the problem areas.

Increasingly over the years, IDOT has recognized the need to restructure the existing structure computer system to better address developing needs. With the advent of more sophisticated computer capabilities, it seemed timely to redesign the structure file to enhance the update process and to include additional data items to meet the continually increasing needs of the data users. The goal was (and still is) to provide an information system to better serve the Department as well as the local agencies throughout the state.

C. COMPUTER SYSTEMS

The Bureau of Operations in addressing a need to improve its management of structures and other highway specific information, developed the Maintenance Management Information System (MMIS) in cooperation with the Bureau of Information Processing. The structure portion of the system assigns responsibility for updating state responsibility structures' inspection information to the District Operations offices. (Inspection interval information is still the responsibility of the Central Office Bureau of Bridges.) Bridge Maintenance Engineers can edit specific structure information directly through a set of update screens accessed by computer terminals. Any update becomes effective immediately and all structure data is accessible for viewing using MMI inquiry screens or via hardcopy reports requested from and generated by the system.

The Illinois Structure Information System (ISIS) has been developed to replace the structure file in the HRDB. It utilizes "mainframe" computer equipment and consolidates several structure-related files, expands the old system and provides more opportunities for expansion and flexibility. This system assigns update responsibility to various Central Bureaus (as well as all District offices) through a series of update screens accessed by computer terminals and PC's. Any update becomes effective immediately

and is accessible for viewing on a set of inquiry screens. Reports can be requested from and generated by the computer system. (See Appendix IV for ISIS screens.)

Initially, the ISIS and MMIS only exchanged information weekly. Thanks to technology improvements thru the years and increasing demands for current information, that schedule has been changed to nightly. Currently, the MMIS and ISIS exchange overnight any information that was updated during the daytime hours. At the beginning of each day, both systems are compatible. Recalculations of computer-generated items are also made after the nightly exchange has successfully completed. Reports required by FHWA are generated from the data base that results from the information exchange of these two systems.

The revised Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges (a.k.a. FHWA Coding Guide) was issued in December 1988, "to bring about more uniform and accurate ratings for bridges...minimize any inequities in (federal) apportionment of bridge funds and...serve as a basis for developing the level of service method for evaluating bridge needs". The 1988 revised FHWA Coding Guide necessitated changes to both the MMIS and ISIS. As a result of the FHWA changes coupled with the need to reassess the existing structure file, the ISIS (or SIP) manual was developed and its first version became effective January 1, 1990. The FHWA now has a December 1995 version of the Coding Guide and an information update process in place known as Errata Sheets. Should revisions to the FHWA Coding Guide occur between the timeframe that an entirely new Coding Guide is issued, the information will be transmitted to Coding Guide users via the Errata Sheets.

In the mid 1990's, IDOT developed a PC version of the ISIS database to be used for the viewing, querying, and report generation of structure information. Known as the "Structure Information and Management System" (SIMS), it provides users with a Microsoft PC Access database that is copied nightly from the ISIS database. Users can query structure information (information is presented in the same format as the ISIS inquiry screens), generate standard reports, and create their own reports. All users of the SIMS database and its data must follow the following IDOT approved protocol:

Excerpt from SIMS User Guide Page 2, Revised 08/20/1998:

"The data in SIMS is intended to be used for the preparation of internal documents and reports. Specific inquiries for information, from outside the department, should be referred to either the Office of Public Affairs or the Office of Planning and Programming. Official departmental response to data inquiries should be prepared by or reviewed by these offices."

D. STRUCTURE DATA BASE

The term "structure" is broad and in the context of this manual includes bridges, culverts, tunnels, pedestrian overpasses, pipeline structures, tollway restaurant overheads and other structures that accommodate or limit the continuity of highways.

A bridge is generally defined as a structure carrying a roadway over a stream, railroad, another roadway or depression. A culvert is generally defined as a structure that carries a stream under the roadway.

The data base (MMIS and ISIS combined) contains data for all structures that meet or exceed the minimum length specified to be designated as a bridge for NBIS. There are also structures of lesser lengths recorded in the data base to satisfy various tracking needs.

The following definition is used by AASHTO, and is given in the NBIS:

A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than twenty feet between undercopings* of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening.

All structures involving a highway, and having an opening length as described above (greater than twenty feet) are required to be included regardless of the highway systems on which they are located. This measurement is recorded in Item 112 - AASHTO BRIDGE LENGTH. All other structures having an opening length of less than or equal to twenty feet and involving a highway, may be accepted into the system only if prior approval is given by the Central Office Planning Services Section - Data Management Unit. This office does not encourage the input of these structures. However, they will be accepted on an "as needed" basis.

* The undercoping of an abutment is the point where the bridge bearing seat intersects the front face (usually nearly vertical) of the abutment. Where there is a distinct abutment pile cap, it is the point of intersection on the abutment wall or piling with the cap.

E. IDENTIFICATION BY STRUCTURE NUMBER

Each structure is identified by a 7-digit structure number composed of a 3-digit structure county number and a 4-digit structure sequence number. Once the structure number has been assigned, that number is permanent and will not be changed even though a change in maintenance responsibility may occur. Data for the old number will be retained in a historical file. Similarly, a bridge constructed using any portion of the same substructure will keep its same number. Completely new bridges erected at the same location on the same or new alignment that do not use any part of the old bridge will be assigned a new number. New structures are to be assigned numbers using the next available number by district scheme.

NOTE: THERE IS NO STATEWIDE SCHEME TO CATEGORIZE STRUCTURES BY NUMBER.

ASSIGNMENT OF STRUCTURE NUMBERS FOR STATE MAINTAINED STRUCTURES

The District Bureau of Planning should assign the structure number when the project is initiated.

ASSIGNMENT OF STRUCTURE NUMBERS FOR LOCAL MAINTAINED STRUCTURES

The structure number is to be assigned by the maintaining agency and submitted to the District Bureau of Planning through the District Bureau of Local Roads and Streets. For new bridges, the structure number is to be assigned and submitted for inclusion in ISIS no later than submittal of preliminary Bridge Design; or Type, Size and Location (TS&L) plans for Central Office approval.

The structure number must be shown on the bridge plans along with the rest of the structure nameplate information.

As coordinators for structure number reporting, the District Bureau of Planning should continue their monitoring efforts to avoid duplicating structure numbers. They should also maintain sufficient records to assure that the appropriate structure number is for the first time record creation for the structure.

F. STRUCTURE NUMBER MAPS

Structure Number Maps have been prepared on various county and municipal maps that indicate the location of each structure by structure number. The District Bureaus of Planning are charged with keeping the maps current with the cooperation of Local Agencies. Copies of these maps can be obtained through the District Bureaus of Planning.

G. WHEN TO REPORT CHANGES

Inventory and inspection changes to existing structures are required by IDOT to be entered into the data base within 90 days of occurrence for state maintained structures and within 180 days for local maintained structures. New structures can be added to the data base at any time after the structure number has been assigned, but no later than the aforementioned time limits after opening to traffic. When adding a new structure to the file, the following items are the minimum needed to make the addition:

<u>Number</u>	<u>Description</u>
3 & 8A	Structure Number
3B & 3B1	Maintenance County, Maintenance Township
21	Maintenance Responsibility
22A	Reporting Agency
42A&B	Type of Service On & Under

All other data items applicable to the structure must be entered into the data base within the time frame as previously discussed.